APPENDIX C. DECISION SKILLS TRAINING

A number of concepts were mentioned in the text as the elements of Decision Skills Training, a recommended strategy under Goal 74 (preparing leaders for decision-making under stress.) This Appendix describes the concepts more fully. As noted in the body of this report, the ability to make decisions under stress represents what may be the single most important skill needed to improve firefighter safety. By preparing their people to make decisions, the agencies will make one of the most important human factor changes possible in their organizational culture. Firefighters keep themselves out of harm's way by making good decisions and by responding appropriately when faced with unexpected fire behavior, the risk of being overrun by a fire or other challenges to their safety.

The approach outlined here presents a strategy that enables the agencies to improve their people's decision-making performance in three ways: First, by providing a framework in which the agencies can identify key decision requirements faced by firefighters and use that knowledge to design effective training simulations and tactical decision exercises. Second, by helping individual fire personnel identify the challenging decisions they face in performing their duties. When firefighters employ the decision requirements concept as a training activity they will realize that being able to identify decision requirements is a skill they need. And finally, the concept presented here provides individual firefighters with the ability to reflect on their own abilities to make decisions and, if needed, seek out feedback, training and opportunities to gain expertise.

Specific Training Requirements

1. Decision Requirements Exercise

The first concept in Decision Skills Training is to identify decision requirements, which are:

- The difficult and critical judgments and decisions faced by firefighters (at various levels)
- The reasons why those critical judgments and decisions are difficult
- The types of cues and patterns used by experienced supervisors

The term "decision requirements" sometimes also includes the identification of opportunities available to gain such expertise.

The agencies need to establish decision requirements in the course of developing a decision skills training program, but the process of doing this (i.e., establishing decision requirements) is an exercise in itself to conduct as part of decision training.

Typically, few supervisors realize how many "tough calls" they must make. A list of the types of decisions that need to be made provides a blueprint for the training on types of decision skills that a seasoned, veteran wildland firefighter must have. For example, if a crew is to be transported by helicopter and then hike to the fireline, a supervisor must judge the amount of time the hike will take (e.g., to make sure they arrive in time to be effective, and before it gets dark). Supervisors rarely receive training to make these estimates, or at best, are provided with "rules of thumb" (e.g., it takes about an hour to go 2.5 km). However, the supervisor's estimate preferably should be made in light of the nature of the terrain, weather, personnel fatigue, the amount of gear being carried, etc.

Once it is agreed that a particular type of estimate or decision, such as the foregoing example, needs to be made fairly often, it becomes straightforward to prepare a training regimen for it. Using the example above, the agencies can train supervisors to frequently estimate times of arrival, get feedback about the accuracy of their estimates, and investigate the reasons for inaccuracy when they get it wrong. Without systematic feedback, the supervisor is unlikely to develop the estimating skill. Although the timing estimate may be difficult, once the supervisor can obtain systematic feedback, the agencies can expect a quick increase in accuracy and skill.

Thus in designing training for decision-making, the agencies can achieve skill improvement for a wide variety of types of judgments, but only after they are identified and made the subject of learning. This is the basic premise of training on decision-making.

2. "Tactical Decision Games" refer to low-fidelity, paper-and-pencil simulations of incidents that might occur in the field. The Tactical Decision Game presents the trainee with a dilemma, preferably a situation with high levels of uncertainty, and time pressure. Each participant has 3-5 minutes to consider how he or she would react. These Tactical Decision Games are intended to provide artificial experiences, and to allow practice in rapid decision-making under time pressure and uncertainty.

Tactical Decision Games can be played individually, or in groups. When done in groups, time is needed to assemble and coordinate the players. However, working in groups provides the opportunity for group members to compare their approaches, and realize how many different interpretations and reactions were possible.

Tactical Decision Game materials usually include no more than a map and a page describing the scenario. In one setting, we used a photograph of a situation to show the layout of terrain, and a second photograph that had been touched up to show flames and smoke. The scenario description provides details about how long the fire has been burning, wind direction and velocity, weather forecasts, and the supervisor's assignment. The scenario also includes some unexpected development (e.g., change in wind, failure of equipment, injury to a crew member) requiring a rapid response. The rules of the game require that participants respond rapidly and in the form of giving orders or directions to crew members, mimicking the real world. We don't want the decision makers to describe what they think should be done, but rather to act decisively, issuing crisp instructions. After the decision is made, the Tactical Decision Game requires a discussion of the rationale for the action, including the player's understanding of the dynamics of the situation.

Tactical Decision Games add to the trainees' experience base, prepares them to respond under uncertainty and time pressure, and requires them to formulate their intent. It is not difficult for people to develop their own Tactical Decision Game scenarios to fit the scenarios more closely to the problems they are encountering (i.e., to work on their primary decision requirements). The process of building a Tactical Decision Game is itself a useful learning experience.

3. ***The "Decision Critique"*** is a method for reflecting what went well and not so well during an incident, and how the good and bad decisions were made. The method can also be used to debrief players after they finish Tactical Decision Games. The goal is to use this reflection to increase the degree to which people learn from experience. There is probably little value in this type of reflection for routine operations. However, for difficult operations, particularly those entailing high levels of risk, there can be enormous value in an after-action review.

The decision critique provides a checklist of issues to be considered during such a review (e.g., timeliness of decisions, correctness of decisions). Many organizations conduct after action reviews, covering the actions taken, and other actions that might

have been better. The decision critique complements these efforts by addressing <u>decision processes.</u> These decision processes include patterns that decision makers might have seen earlier, the key cues (seen from the position of hindsight) that the decision maker should have noticed sooner or attended to more carefully, the situation assessments that were mistaken, the uncertainties that were present and how these were handled.

Essentially, the decision critique can use the decision requirements format, listing the key judgments and decisions that were made during the incident, the reasons why they were difficult (particularly with regard to managing uncertainty and seeking information, projecting the situation forward to maintain time horizon, providing shared situation awareness, and ensuring good information management), the subtle cues and patterns that people might miss, and the initial size-up of the situation along with the ways that this shifted during the incident.

In too many settings, people obtain valuable experiences but they are not compiled or reviewed. An exhausted crew might not be eager to hold a seminar, and we do not think that most incidents warrant the use of a decision critique. However, following a near-miss or other incident, firefighters will be motivated to discuss why they got into difficulty, the early signs that crew members had but did not pass along or appreciate, and how they might have handled the situation better. Conducting decision critiques is an important way to improve people's sensitivity to risk.

4. ***The "Pre-Mortem Exercise"*** (as opposed to Post-Mortem analysis) is a way to anticipate risks and identify key vulnerabilities in a plan. After developing a plan, the team spends a few minutes trying to determine where the plan is most likely to fall apart. The objective is to uncover critical flaws and areas of concern that are otherwise ignored. In most settings, once a plan has been developed the critique of it tends to be pretty generous, because no one wants to find a critical flaw (which could generate dissension by criticizing the planner, and could also require the development of a new plan). To overcome this type of inertia, *the Pre-Mortem exercise begins with the assumption that the plan has already failed.* The task of the team is to use their experience to identify the likely reasons for the failure. This exercise consistently generates a wider variety of criticisms, and more serious ones, than a standard critique. The Pre-Mortem exercise could be a valuable means of anticipating risks and formulating contingencies, as well as a learning experience.

5. *"Uncertainty Management"* provides training for another important aspect of skilled decision-making. A common flaw is waiting too long for information, and losing opportunities as a result. To compound this flaw, decision makers sometimes wait for or seek information that is of low value, and/or is unlikely to arrive in time to make a difference. The agencies should train their personnel to appreciate that uncertainty is inevitable, that it is essential to make decisions despite uncertainty, and to gauge the value of seeking additional information versus delaying a decision. We need to be careful in defining what type of uncertainty is to be addressed; there are different types of uncertainty for data elements themselves, inferences based on the data, or projections into the future based on inferences. Different sources of uncertainty also exist, including: missing information items, information items perceived as unreliable, and information that is ambiguous or conflicting.

The uncertainty management training tool identifies the key items of uncertainty in a given situation or scenario presented to the students. This can be done with a Tactical Decision Game or as part of a debrief or critique of an actual incident. Participants in the exercise define the nature of that uncertainty (missing, unreliable, ambiguous, etc.,) and describe an appropriate strategy for managing that uncertainty (to press on, to wait, to actively seek the information considering the likelihood that the data will arrive in time and make a difference, revising the plan to take more contingencies into account, or other types of reactions).

6. *"Situation Awareness Calibration"* refers to a technique for improving team decision-making. The technique ensures that all the team members have a common view of events. Just as accurate situation awareness is essential for supervisors to make good decisions, having a reliable shared situation awareness is essential for the coordination of a team or crew. The exercise is primarily intended for use during training scenarios. At a critical juncture, when uncertainty is high, the team leader calls a "time out" and asks everyone to write down his/her answers to a small set of questions, including:

- What is the primary goal right now?
- Why is it the priority goal?
- What is our biggest worry?
- What will happen in the next 15 minutes?

Once done, the team compares notes. If everyone has the same answers, that is a good sign. More commonly, the team members have different answers, and the team can

discuss the reasons for the divergence, and what they can do to prevent these types of divergences in the future, during a real incident. This method (situation awareness calibration) would usually be too time consuming for use during an actual incident. However, in one case, a nuclear power plant crew that had been taught to use this as a training method encountered a minor accident that eventually took 12 hours to resolve. In the middle of the accident, the supervisor actually called a time out, pulled out the list of questions from his situation awareness calibration sheet, and went through them to ensure that everyone had a shared view. He found that there were some divergences which needed to be cleared up. Decision makers may find this a helpful sanity check during wildland firefighting operations, particularly if they feel nervous about whether the other team members have the same perspective they do.

7. The "Commander's Intent Exercise" is designed to improve a leader's skills at communicating what he/she wants to have happen. This exercise is administered in coordination with a Tactical Decision Game. The person who describes his/her solution to the Tactical Decision Game does so in the form of a set of orders, and a description of the intent behind the orders. The person running the exercise then identifies a plausible but unexpected event that will interfere with that plan. The player who issued the orders and intent then writes down how he/she/expects all of the subordinates to react. At the same time, the subordinates write down how they would actually react. Next, the two interpretations are compared. Typically, everyone is surprised by the different interpretations of intent. The point of the exercise is to improve a commander's intent statements, not by providing a checklist of what to say, but rather by providing direct feedback to enable the commander (or potential commander) to find out how people are interpreting orders that he/she thinks seem clear.

The Situation Awareness Calibration method and the Commander's Intent Exercise are variants of Decision Skills Training that are designed to improve team decision-making and to improve communications skills. Under time pressure and other stresses, decision makers may find it difficult to explain things clearly. The ambiguities that creep into their directives can have profound implications. Rather than try to exhort them to think before they speak, or to follow some checklist to produce a clear statement of intent, we find it better to devise a means of feedback that will let decision makers see for themselves the consequences of unclear communications. In a context-bound situation (including a Tactical Decision Game), a decision maker can see the linkage between a poorly-phrased message and the resulting confusions and disagreements. Further, the decision maker can reflect on the way the message would have needed to be

phrased in order to prevent the confusion. Learning sometimes seems to be a simple matter of practice and feedback. However, opportunities for focused feedback for critical skills are difficult to find. Providing those opportunities is the goal of the Decision Skills Training program.

Experience with Decision Skills Training

The type of Decision Skills Training program described above has been used in a variety of environments, including a university graduate program in management, a major municipal fire department, and the firefighters at a petrochemical refinery. The most extensive application has been for the U.S. Marine Corps (USMC), where the goal of the effort was to train approximately 30 squad leaders to handle a variety of decisions during a field exercise. Squad leaders are non-commissioned officers, high school graduates (but usually without college experience) who typically have 4-8 years of experience in the USMC. Their period of training was three and a half months, from November 1996 to late February 1997, but only a few hours per week could be allocated to the decision training.[1]

The motivation for the Marine effort was the establishment of a new Special Purpose Marine Air Ground Task Force (MAGTF). It was designed to rely on a command post that might remain safely at sea during a military operation, thereby reducing the continual need to protect and move it. Consequently the squad leaders and enlisted men were going to have to function very independently. Although the Marines provide a great deal of command training to officers, they provide little, if any, such training to their enlisted personnel. Accordingly, the requirement was to quickly improve the ability of the squad leaders to make judgments and decisions during a large-scale exercise in February-March 1997.

In the field, the battalion had three companies, each with nine squad leaders. The squad leaders for each company were given the decision skills training as a company, so there were three separate groups of nine trained in parallel. The developers of the Decision Skills Training program provided the initial training for each method. Follow-on repetitions were provided by platoon leaders attached to each company. Five of the seven tools described above were used: Decision Requirements Exercise, Tactical Decision Games, Decision Critique, Pre-Mortem Exercise, and the Commander's Intent

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[1] The training was conducted by Klein and Associates, a subcontractor to the project and principal author of this Appendix.

Exercise. The uncertainty management and situation awareness calibration tools were not used for lack of time.

The basic concept used for the training was for the Marines to practice decision-making several times a week, particularly using the Tactical Decision Games. Historically, the Marines are strongly motivated to maintain their physical conditioning. They adopted and sold this program as a way to similarly maintain their mental conditioning, recognizing that success would require continuous repetitions.

The Marines who were trained responded very favorably; when the squad leaders were asked to rate the usefulness of the training, the average response was 2.68 on a 3-point scale. The independent raters who evaluated their performance on the Tactical Decision Games noted a sharp increase in the quality of their decisions between the first exercise and the subsequent ones. The informal comments were also very favorable; some of the squad leaders and their platoon leaders attributed much of their high level of performance in the field to the Decision Skills Training.

The U.S. Marine Corps is currently preparing to incorporate a Decision Skills Training program coupled with an OJT program into its training for both senior enlisted personnel and officers. The intent is to make these skills a part of the repertoire of the Marines of the future.

Training for Various Stresses – Surprisingly, research by one of the authors (Klein and Associates) has found that by training people under one kind of stress (e.g., time constraints or high uncertainty), organizations can immunize their decision makers to other stresses (noise, information overload, physical, psychological). Others have found this, too. In addition to the above exercises conducted under time pressures, the U.S. Navy is developing techniques for "stress inoculation" training that could be useful in the wildland firefighting community.[2, 3] Thus decision skills training is also training for decision-making under stress.

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[2] J.F. Driskell and F. Salas (Eds.), Stress and Human Performance, Hillsdale, NJ: Erlbaum, 1996.
[3] J. A. Cannon-Bowers and B. Salas (in press), "Decision-Making Under Stress: Implications for Training and Simulation, Washington, DC: American Psychological Association Press.

Establishing Decision Skills Training for Wildland Firefighting

The steps required to establish a Decision Skills Training program for Federal wildland firefighters are basically similar to those discussed for establishing a formal OJT program:

1. ***Establish the target groups for the program.*** We suggest that the agencies first target Crew Supervisors, the people at the sharp end of the decision hierarchy, who need to make the most time-pressured decisions. Next in priority would be the Strike Team/Task Force Leaders and Division/Group Supervisors, because they also are called on to make many high-stakes decisions.

2. ***Develop the instructional materials and framework***. The starting point for the program could be a course prepared for Crew Supervisors. As with the OJT program, we suggest that this **not** be a one-shot course that would be quickly forgotten. Rather, provision needs to be made to have a series of follow-up sessions to reinforce the use of decision skills. While we suggested a three-part workshop for establishing an OJT program, we recommend that the agencies frame Decision Skills Training as a standard activity each week. It may be good to borrow from the Marines and incorporate it into a "mental conditioning" counterpart to physical conditioning training. This may be more feasible for some types of firefighters than others, e.g., Type I crews, engines, and helitack. Where not feasible, the Decision Skills Training can be offered in a stand-alone course, or as part of another course, or as a training session followed up by refresher training.

   The initial course could be a four-hour program that describes the principles of effective decision-making in the field, and introduces three tools, the Tactical Decision Games, the Decision Requirements, and the Decision Critique. Confusion, rather than clarity, results if all seven tools are covered in the initial presentation. It is best to briefly introduce all seven, but to only provide experience with three. The initial session can use videotaped lectures to describe the overall program and each of the three tools, to cut down on instructor expenses. However, the trainees will need to practice performing the Tactical Decision Games and practice conducting a Decision Critique. It can work well to use a Tactical Decision Game based on a real incident that all have heard about, or an incident in which some of the Crew Supervisors participated. It is also important to use a hands-on exercise for the trainees to identify their own Decision Requirements, in order to feel ownership.

Because of this need for interaction, the workshops are most effective when taught to groups of 8-12 people at a time.

Because the Decision Skills Training program is designed to be conducted in the field, the costs should be minimal. The primary effort will be to prepare the initial training package to teach the Crew Supervisors, Strike Team/Task Force Leaders and Division/Group Supervisors how to use the seven different tools. The initial training package could be presented in a classroom setting, or added to the OJT program and conducted in the field. New Tactical Decision Games can be developed either in-house or by contractors.

Several of the tools can be incorporated into the schedule of actual firefighting operations as "on-the-job" training. The Decision Critique can be used after harrowing experiences, the Pre-Mortem exercise during planning for operations, and the Situation Awareness Calibration checklist in the middle of an operation. When firefighting operations are not being conducted, the other tools could be applied, particularly the regular use of Tactical Decision Games. The Marine Corps Gazette now publishes a new Tactical Decision Game every month, to allow Marines all over the world to try their hand. The magazine also publishes some of the most interesting solutions the following month to provide feedback. A similar approach could be used for the wildland firefighting community, using an existing publication or a new newsletter to publish firefighting Tactical Decision Games (we earlier recommended a new newsletter for disseminating safety case studies).

We envision the Decision Skills Training program as an ongoing drill, a mental conditioning program, rather than as a set of materials to be covered. In the USMC project, the platoon leaders took on the responsibility of running the drills each week. It is not clear how, or if, this could be sustained in the fire agencies.

The USMC is preparing two separate Decision Skills Training courses. One is for senior enlisted Marines, who have a great deal of responsibility in the field. The second course is for officers, who are the decision makers and will be moving upward in responsibilities. The fire community might also require two separate stand-alone courses, one for Crew Supervisors, Strike Team and Task Force Leaders and one for fireline overhead and Incident Management Team members. The Marine courses can provide examples and formats to use as a starting point.

3. ***Selecting Trainers*** – The trainers are likely to discover that they gain a valuable informal evaluation of personnel who participate in this decision training. They also are likely to find that they then can develop their own Tactical Decision Games to remedy areas in which they perceive weaknesses. Therefore, we suggest that the preferred means of running the program is for Operations Section Chiefs to train Division/Group Supervisors and for Division/Group Supervisors to lead the sessions for Crew Supervisors, Strike Team Leaders and Task Force Leaders. The training can be fine-tuned, and the act of training will build relationships as a by-product.

   Incident Management Team members should receive decision skills training in the S-420 and S-520 courses. The decision training described above can be added to these courses.

4. ***Prepare the Organizational Support*** – The required support for Decision Skills Training is much less than for the OJT program. We do not feel that a systematic effort is needed to sustain the Decision Skills Training, especially if an OJT program is established that can be used as a platform for conducting the Decision Skills Training. The requirement to sustain Decision Skills Training is four-fold:
   - Ensure that new Operations Section Chiefs and Division Supervisors as well as S-420 and S1-520 training cadres are prepared to administer the Decision Skills Training program;
   - Ensure that new Crew Supervisors and Strike Team/Task Force Leaders are presented with the Decision Skills Training program;
   - Ensure that there is a mechanism to publish new Tactical Decision Games;
   - Ensure that agency leadership demonstrates an interest in and commitment to the program.

   If the agencies can develop this framework to teach decision skills, they will benefit by enhancing leaders' ability to detect problems early and communicate clear assessments and intentions. By providing opportunities to make decisions under time pressure and uncertainty, and by providing exercises to accumulate a larger set of experiences, the training should result in hardened decision makers, prepared to make tough calls, particularly the decisions to avoid or withdraw from risky situations despite organizational pressures to stay the course.

5. ***Evaluation*** – Formal evaluation of a Decision Skills Training Program can be difficult and labor intensive. Observers at the training sessions may inhibit the

participants and take away from active participation in the exercises. However, there are other ways to evaluate the results of the training, such as observing decision performance before and after the course, and polling trainees.

When the USMC used the Tactical Decision Games (and other tools), the platoon leaders commented that they had gained a much stronger appreciation of the abilities of the squad leaders than they had before. In one company, a platoon leader who was in charge of training squad leaders from three different platoons, said that he had a better idea of the decision skills of the squad leaders from the other platoons than their own platoon leaders did.